

What is claimed is:

1. A pretreatment process for solid lump feed material for gas and pellet/lump-based direct reduction processes, comprising:

preheating feed material to a temperature of from about 200C to about 500C, without reduction, in a non-reducing atmosphere prior to charging the feed material to gas-based direct reduction furnace;

thereby minimizing the formation of fines within the furnace.

2. A process according to claim 1, wherein the feed material is preheated to a temperature of about 200C to 425C.

3. A process according to claim 1, wherein said preheating is accomplished in a feed storage bin by introduction of waste off-gases at a sufficient to heat the feed material in the storage bin.

4. A process according to claim 3 wherein the waste off-gas temperature is in excess of 500C upon introduction into the feed storage bin.

5. A process according to claim 3, wherein said waste off-gases are removed from a reformer associated with the direct reduction process.

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6. Apparatus for preheating feed material to a direct reduction furnace, comprising:
  - a furnace having an upper feeding and heating portion, a middle gas feeding and reducing portion, and a lower product discharge portion;
  - means for removing hot gas from the furnace;
  - reformer means for reforming removed off-gas, including means for heating the reformer by combustion of gas, and means for removing waste combusted off-gas from the heating of the reformer;
  - a feed material storage bin, said means for removing waste off-gas communicating with said storage bin for heating the contents thereof; and
  - means for transporting the heated feed material to the furnace and for charging the heated feed material into the furnace for reduction.
  
7. Apparatus according to claim 6 wherein said feed storage bin is enclosed, and said means for transporting the heated feed material to the furnace is insulated.